

CLAIMS:

What is claimed is:

1. A computerized method for processing an image obtained by scanning, said image including at least a plurality of pixels, said pixels each having a value representative of an optical characteristic of a scanned object, said method comprising:
  - identifying a plurality of pixels along at least one edge portion of the image as a function of the pixel values;
  - defining one or more edges of the image from the identified pixels;
  - determining an orientation of the image relative to a target orientation as a function of the defined edges; and
  - adjusting the orientation of the image portion to correspond to the target orientation.
2. The computerized method of claim 1, wherein identifying the pixels along the edge portion of the image includes distinguishing the edge portion of the image from a border portion of the image adjacent the edge portion, said pixels along the edge portion of the image having substantially different pixel values than said pixels in the border portion of the image.
3. The computerized method of claim 2 further comprising cropping the adjusted image to eliminate the border portion.
4. The computerized method of claim 1, wherein defining the edges of the image includes matching the identified pixels to a predefined shape.
5. The computerized method of claim 1, wherein the image is a substantially rectangular shape having four corners, and wherein identifying the pixels along the edge portion of the image includes processing the image as a function of pixel values to identify corners of the image.

6. The computerized method of claim 5, wherein identifying the corners includes: defining a plurality of at least substantially diagonal processing lines relative to the target orientation, each processing line having a first position tangentially aligned to a different corner of the image;

repositioning each of the processing lines a predetermined distance towards a center of the target orientation until each of the processing lines intersects one of the pixels having a pixel value substantially different than previously processed pixels; and recording a location of each of the intersected pixels.

7. The computerized method of claim 5, wherein processing the image includes: defining at least one horizontal processing line relative to the target orientation, said horizontal processing line having a first position coincident with a top side or a bottom side of the image;

defining at least one vertical line relative to the target orientation, said vertical processing line having a first position coincident with a right side or a left side of the image;

repositioning each of the horizontal and vertical lines a predetermined distance towards a center of the target orientation until each of the processing lines intersects a pixel having a pixel value substantially different than previously processed pixels; and recording a location of each of the intersected pixels.

8. The computerized method of claim 1, wherein the plurality of pixels are arranged in rows and columns, and wherein identifying the pixels along the edge portion of the image includes:

analyzing each column to identify a horizontal transition point at which pixels transition from a first value to a second value, said first and second values being substantially different from each other;

grouping the horizontal transition points to identify top and bottom edges of the image.

9. The computerized method of claim 1, wherein the plurality of pixels are arranged in rows and columns, and wherein identifying the pixels along the edge portion of the image includes:

analyzing each row to identify a vertical transition point at which pixels transition from a first value to a second value, said first and second values being substantially different from each other; and

grouping the vertical transition points to identify left side and right side edges of the image.

10. The computerized method of claim 1, further comprising applying a Laplacian filter to each pixel to identify one or more transition points between adjacent pixels.

11. The computerized method of claim 1, wherein determining an orientation of the image includes:

defining a reference axis;

grouping the identified pixels to define an outline of the image;

comparing the defined outline to the reference axis; and

determining an orientation error between the determined orientation of the image and the target orientation as a function of the comparison.

12. The computerized method of claim 11, wherein the adjusting includes:  
identifying a point of rotation; and

rotating the image about the identified point of rotation in response to the determined orientation error.

13. The computerized method of claim 11, wherein the adjusting further includes sizing the image to correspond to a target size.

14. One or more computer-readable media having computer-executable instructions for performing the method of claim 1.

15. A computer-readable medium having computer-executable instructions for processing a digital image, said digital image including a border portion and an image portion, wherein the border portion and the image portion each include at least a plurality of pixels, said pixels each having a value representative of an optical characteristic of a scanned object, comprising:

identifying instructions for identifying a plurality of pixels along at least one edge portion of the image portion as a function of the pixel values, wherein said pixels in the border portion have substantially different pixel values than said pixels in the image portion of the image, and wherein said pixels along the edge portion of the digital image distinguish the image portion of the digital image from the border portion adjacent the edge portion;

defining instructions for defining one or more edges of the image portion from the identified pixels;

determining instructions for determining an orientation of the image portion relative to a target orientation as a function of the defined edges;

adjusting instructions for adjusting the orientation of the image portion to correspond to the target orientation; and

cropping instructions for cropping the adjusted image portion to eliminate the border portion.

16. The computer-readable medium of claim 15, wherein defining the edges of the image portion includes matching the identified pixels to a predefined shape.

17. The computer-readable medium of claim 15, wherein the image portion is a substantially rectangular shape having four corners, and wherein identifying instructions for identifying the pixels along the edge portion of the image portion includes processing the digital image as a function of pixel values to identify corners of the image.

18. The computer-readable medium of claim 17, wherein processing the digital image to identify corners includes:

defining a plurality of diagonal processing lines relative to the target orientation, each diagonal processing line having a first position tangentially aligned to a different corner of the image;

repositioning each of the diagonal processing lines a predetermined distance toward a center of the target orientation until each of the processing lines intersects one of the pixels having a pixel value substantially different than previously processed pixels; and

recording a location of each of the intersected pixels.

19. The computer-readable medium of claim 15, wherein the plurality of pixels are arranged in rows and columns, and wherein identifying instructions for identifying the pixels along the edge portion of the image portion includes:

analyzing each column to identify a horizontal transition point at which pixels transition from a first value to a second value, said first and second values being substantially different from each other; and

grouping the horizontal transition points to identify top and bottom edges of the image portion.

20. The computer-readable medium of claim 15, wherein the plurality of pixels are arranged in rows and columns, and wherein identifying instructions for identifying the pixels along the edge portion of the image portion includes:

analyzing each row to identify a vertical transition point at which pixels transition from a first value to a second value, said first and second values being substantially different from each other; and

grouping the vertical transition points to identify left side and right side edges of the image portion.

21. The computer-readable medium of claim 15, wherein determining instructions for determining an orientation of the image portion include:

defining a reference axis;

grouping the identified pixels to define an outline of the image portion;

comparing the defined outline to the reference axis;

determining an orientation error between the determined orientation of the image portion and the target orientation as a function of the comparison; and

sizing the image portion to correspond to a target size.

22. The computer-readable medium of claim 21, wherein the adjusting instructions include:

- identifying a point of rotation; and
- rotating the image about the identified point of rotation in response to the determined orientation error.

23. A system for processing an image, said image including at least a plurality of pixels, said pixels each having a value representative of an optical characteristic of a scanned object, said system storing computer-executable instructions to do the following:

- identifying a plurality of pixels along at least one edge portion of the image as a function of the pixel values;
- defining one or more edges of the image from the identified pixels;
- determining an orientation of the image relative to a target orientation as a function of the defined edges;
- adjusting the orientation of the image portion to correspond to the target orientation; and
- cropping the adjusted image to eliminate the border portion.

24. The system of claim 23, wherein identifying the pixels along the edge portion of the image includes distinguishing the edge portion of the image from a border portion of the image adjacent the edge portion, said pixels along the edge portion of the image

having substantially different pixel values than said pixels in the border portion of the image.

25. The system of claim 23, wherein defining the edges of the image includes matching the identified pixels to a predefined shape.

26. The system of claim 23, wherein the image is a substantially rectangular shape having four corners, and wherein identifying the pixels along the edge portion of the image includes processing the image as a function of pixel values to identify corners of the image.

27. The system of claim 26, wherein identifying the corners includes:

defining a plurality of at least substantially diagonal processing lines relative to the target orientation, each processing line having a first position tangentially aligned to a different corner of the image;

repositioning each of the processing lines a predetermined distance towards a center of the target orientation until each of the processing lines intersects one of the pixels having a pixel value substantially different than previously processed pixels; and recording a location of each of the intersected pixels.

28. The system of claim 23, wherein the plurality of pixels are arranged in rows and columns, and wherein identifying the pixels along the edge portion of the image includes:



analyzing each column to identify a horizontal transition point at which pixels transition from a first value to a second value, said first and second values being substantially different from each other;

grouping the horizontal transition points to identify top and bottom edges of the image.

29. The system of claim 23, wherein the plurality of pixels are arranged in rows and columns, and wherein identifying the pixels along the edge portion of the image includes:

analyzing each row to identify a vertical transition point at which pixels transition from a first value to a second value, said first and second values being substantially different from each other; and

grouping the vertical transition points to identify left side and right side edges of the image.

30. The system of claim 23, wherein determining an orientation of the image includes:

defining a reference axis;

grouping the identified pixels to define an outline of the image;

comparing the defined outline to the reference axis;

determining an orientation error between the determined orientation of the image and the target orientation as a function of the comparison; and

sizing the image to correspond to a target size.

31. The computerized method of claim 30, wherein the adjusting includes:

identifying a point of rotation; and

rotating the image about the identified point of rotation in response to the determined orientation error.